What is claimed is:

1. An isolated, vertebrate nucleic acid molecule encoding dorsalin-1.

2. An isolated, vertebrate DNA molecule of claim 1.

3. An isolated, vertebrate cDNA molecule of claim 2.

4. An isolated, vertebrate genomic DNA molecule of claim 2.

5. An isolated, vertebrate RNA molecule of claim 1.

6. An isolated, human nucleic acid molecule of claim 1.

7. An isolated, mouse nucleic acid molecule of claim 1.

8. An isolated, chick nucleic acid molecule of claim 1.

9. A nucleic acid molecule comprising a nucleic acid molecule of at least 15 nucleotides capable of specifically hybridizing with a nucleic acid molecule of claim 1.

10. An isolated nucleic acid molecule of claim 2 operatively linked to a promoter of RNA transcription.

11. A vector which comprises the isolated nucleic acid molecule of claim 10.

12. A vector of claim 10, wherein the isolated nucleic acid molecule is linked to a plasmid.

13. The plasmid of claim 12 designated pKB502 (ATCC Accession No. 75321).

14. A host vector system for the production of a polypeptide having the biological activity of dorsalin-1 which comprises the vector of claim 11 in a suitable host.

15. A host vector system of claim 14, wherein the suitable host is a bacterial cell, insect cell, or animal cell.

16. A method of producing a polypeptide having the biological activity of dorsalin-1 which comprises growing the host vector system of claim 14 under suitable conditions permitting production of the polypeptide and recovering the polypeptide so produced.

Sub a1

17. A purified vertebrate dorsalin-1.

18. A purified human dorsalin-1 of claim 17.

19. A polypeptide encoded by the isolated vertebrate nucleic acid molecule of claim 1.

Sub a2

20. A method for stimulating neural crest cell differentiation in a culture comprising administering an amount of the purified

dorsalin-1 of claim 17 effective to stimulate neural crest cell differentiation to the culture.

21. A method for stimulating neural crest cell differentiation in a subject comprising administering to the subject an amount of the purified dorsalin-1 of claim 17 effective to stimulate neural crest cell differentiation.

22. A method for regenerating nerve cells in a subject comprising administering to the subject an amount of the purified dorsalin-1 of claim 17 effective to regenerate nerve cells.

23. A method for promoting bone growth in a subject comprising administering to the subject an amount of the purified dorsalin-1 of claim 17 effective to promote bone growth.

24. A method for promoting wound healing in a subject comprising administering to the subject an amount of the purified dorsalin-1 of claim 17 effective to promote wound healing.

25. A method for treating neural tumor in a subject comprising administering to the subject an amount of the purified dorsalin-1 of claim 17 effective to inhibit the tumor cell growth.

26. A method of claim 25, wherein the neural tumor is neurofibroma.

27. A method of claim 25, wherein the neural tumor is Schwann cell tumor.

28. A pharmaceutical composition for stimulating neural crest cell differentiation comprising an amount of the purified dorsalin-1 of claim 17 effective to stimulate neural crest cell differentiation and a pharmaceutically acceptable carrier.

29. A pharmaceutical composition for regenerating nerve cells in a subject comprising an amount of the purified dorsalin-1 of claim 17 effective to regenerate nerve cells and a pharmaceutically acceptable carrier.

30. A pharmaceutical composition for promoting bone growth in a subject comprising an amount of the purified dorsalin-1 of claim 17 effective to promote bone growth and a pharmaceutically acceptable carrier.

31. A pharmaceutical composition for promoting wound healing in a subject comprising an amount of the purified dorsalin-1 of claim 17 effective to promote wound healing and a pharmaceutically acceptable carrier.

32. A pharmaceutical composition for treating neural tumor in a subject comprising an amount of the purified dorsalin-1 of claim 17 effective to inhibit neural tumor cell growth and a pharmaceutically acceptable carrier.

33. A pharmaceutical composition of claim 32, wherein the neural tumor is neurofibroma.

34. A pharmaceutical composition of claim 33,

wherein the neural tumor is Schwann cell tumor.

35. A method to produce antibody using the purified dorsalin-1 of claim 18.

36. Antibody capable of binding to dorsalin-1.

Sub a4

37. A monoclonal antibody of claim 36.

38. An antibody of claim 36 capable of inhibiting the biological activity of dorsalin-1.

39. A method for inhibiting dorsalin-1 activity in a subject comprising administering to the subject an amount of the antibody of claim 38 effective to inhibit the dorsalin-1 activity.

40. A pharmaceutical composition for inhibiting dorsalin-1 activity comprising an amount of antibody of claim 38 effective to inhibit dorsalin-1 activity and a pharmaceutically acceptable carrier.

Add a5